## REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Thus, claim 1 has been amended to incorporate the subject matter of claims 2 and 3 (which have therefore been cancelled), as well as to overcome the rejection of this claim under the second paragraph of 35 U.S.C. §112, rendering the rejection moot.

Minor changes have been made in claims 4, 11, 12 and 14.

Claim 16 has been amended to overcome the rejection of this claim under the second paragraph of 35 U.S.C. §112, rendering this rejection moot.

Claims 17-20 have been amended to overcome the rejection of these claims under 35 U.S.C. §101, rendering this rejection moot.

Attached hereto is a marked-up version of the changes made to claims 1, 4, 11, 12, 14 and 16-20 by the current amendment. The attached pages are captioned "**Version with markings to show changes made.**"

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Thus, the rejection of claims 1-16 under 35 U.S.C. §102(b) or 35 U.S.C. §103(a) based on Smith et al., as well as the rejection of claims 17-20 under 35 U.S.C. §103(a) as being unpatentable over this reference, are respectfully traversed.

This reference discloses the production of high purity hydrogen from a hydrocarbon source by steam reforming or partial oxidation and shift reaction. Purification is obtained by removing $CO_2$ by absorption at low temperatures in methanol, and removing CO by adsorption at low temperatures.

The reference method is distinguishable from the present invention by the following features:

1. Autothermal reforming is not described as one option for syngas generation. (Partial oxidation, or POX, uses an excess of oxygen and no catalyst bed).

2. Production of high purity hydrogen.

3. Use of low-temperature absorption and adsorption processes.

For these reasons, Applicants take the position that the presently claimed invention is patentable over this reference.

The rejection of claims 1-16 under 35 U.S.C. §103(a) as being unpatentable over Clawson et al. '425 in view of either Krishnamurthy et al. or Smith et al. is respectfully traversed.

The comments set forth above concerning the Smith et al. reference are considered to be equally applicable to this rejection.

The Clawson et al. '425 reference discloses a special design (method) of a reactor for reforming of hydrocarbons using air/oxygen. The focus is on heavier fuels than natural gas and use in cars with fuel cells, thereby requiring compact design and heat integration.

The Krishnamurthy et al. reference discloses the production of high purity hydrogen and liquid $CO_2$ from a hydrocarbon source by steam reforming and shift reaction. PSA technology is used to separate the different gaseous components, and the purity of the hydrogen is at least 99.999%. Therefore, this reference is different from the present invention in the following respects:

1. Steam reforming, i.e. no addition of oxygen or air to the reformer reactor.
2. Production of liquid $CO_2$.
3. Production of high purity hydrogen (by PSA).

In conclusion, although the Examiner states that it is well known that hydrocarbons can be reformed into synthesis gas by reaction with water (steam) and oxygen with subsequent shift reaction, and that this synthesis gas can be separated into a hydrogen and a $CO_2$ containing steam, the references do not suggest that these series of process steps can be performed in a simplified manner to produce the hydrogen only sufficiently pure to reduce $CO_2$ emissions by a significant amount when combined with $CO_2$ deposition. In other words, some impurities (methane, CO, $CO_2$) may be allowed in the hydrogen as long as a significant proportion of the carbon is removed from the feed. All previously described techniques have been concerned with producing high-purity hydrogen, and the methods developed therefore are unnecessarily complicated and costly.

For these reasons, Applicants take the position that the presently claimed invention is patentable over the applied references.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

Ola OLSVIK et al.

By: 

Michael R. Davis
Registration No. 25,134
Attorney for Applicants

MRD/pth
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
March 31, 2003

## Claims

(Amended)

1. Method for production of a $CO_2$-rich gas stream and a $H_2$-rich gas stream, characterized in that the method comprises the following steps:

a) natural gas and water are fed to a reforming reactor and converted to synthesis gas under supply of ~~a $O_2$-containing gas~~ an $O_2$-rich gas to the reactor in one step;

b) the gas stream from a) is shifted, whereby the content of CO is reduced and the amounts of $CO_2$ and $H_2$ are increased by reaction of $H_2O$; at a ratio $H_2O$:CO of from 1 to 9

c) the gas stream from b) is separated in a separation unit into a $CO_2$-rich and a $H_2$-rich gas stream, respectively.

Twice

4(amended). Method according to claim 1,

characterized in that the ratio $H_2O$:CO in the shift process ~~preferably~~ is from 1.5 to 4.

Twice
11(amended). Method according to claim 1,

characterized in that the reformer reactor ~~preferably~~ is a partial oxidation reactor.

Twice
12(amended). Method according to claim 1,

characterized in that the reformer reactor ~~particularly~~ is an autothermal reformer.

MAR [illegible] 003

(Amended)

14. Method according to claim 11, characterized ~~ved at~~ in that the reforming is carried out without a catalyst.

(Amended) 16. Method according to claim 10, characterized in that ~~at least a part of $N_2$ follows~~ includes at least part of $N_2$ the $CO_2$-rich gas stream.

(Amended) 17. ~~Use of a $CO_2$-rich gas stream produced~~ Method according to claim 1 for injection into marine formations, wherein the produced $CO_2$-rich gas stream is applied

(Amended) 18. ~~Use of a $H_2$-rich gas stream produced~~ Method according to claim 1 for hydrogenation. *

(Amended) 19. ~~Use of a $H_2$-rich gas stream produced~~ Method according to claim 1 as a source of energy / fuel in fuel cells. *

(Amended) 20. ~~Use of a $H_2$-rich gas stream produced~~ Method according to claim 1 for the production of electricity. *

* wherein the produced $H_2$-rich gas stream is applied